Entity Detection and Analysis Using Computer Vision

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The field of computer vision includes a set of main problems such as image classification, localization, image segmentation, and object detection. Among those, image classification can be considered as the fundamental problem. It forms the basis for other computer vision problems. Image classification applications are used in many areas, such as medical imaging, object identification in satellite images, traffic control systems, brake light detection, machine vision, and more. Image classification is the task of categorizing and assigning labels to groups of pixels or vectors within an image dependent on certain rules. The categorization law can be applied through one or multiple spectral or textural characterizations.  
  
Image classification techniques are mainly divided into two categories: Supervised and unsupervised image classification techniques.

One of the important traits which an AI needs to possess is identification. Further enhancements in the productivity of an AI depends on it's ability to learn and improve around it's core function. We aim to delve into the backgrounds of computer vision and study it's evident relationship with identification. With help of various sources we aim to work on a identification system. By using image classification through computer vision we are trying to categorize similar images into a cluster. Categorizing the images into certain clusters which can be easily accessed by the users for example if there were like cars and bikes then the car images gets clustered to cars and bike gets clustered into bikes so that this can access all car images in cars cluster.  
By categorizing the images into clusters it will be easy for users to search or Access certain images they want and only that set of images will be accessed

Deep learning image classification is an enthralling project. Image classification falls under the computer vision project category.

The classification problem entails classifying all the pixels in a digital image into one of the defined classes.

Image classification is the most important application of digital image analysis.

Image classification employs both supervised and unsupervised classification techniques.

In supervised classification, samples are chosen for each target class. We use these target class samples to train our neural network, and then we use it to classify new samples.

We group the sample images into clusters of images with comparable properties in unsupervised classification. Then we classify each cluster into the appropriate classes.

The intended audience for this research paper will be E-commerce segments for sorting out the number of products sold particularly which intact helps in maintaining the business by knowing the product popularity among the market and also it helps Supply chain management for managing the logistics and packaging areas to sort-out according to labels and make supply chain faster and smoother in distributing and segmenting areas. Future AI researchers for those who apply the AI and deep learning models for research work as an example for case for considering our experience With huge possibilities that can be achieved, this study can be incorporated into many fields. We personally think this paper can be an asset to similar people working on Computer Vision.

Definitely the resources. Even huge multi national companies and government supported research departments find themselves in limited supply. We believe that full practical experience and deep knowledge about the working of the machines can be realized with abundant assets. With the help of our personal computers and open source applications we move towards the goal of understanding computer vision There are many challenges faced while working on image categorization. Some of them are intra class variation , Occlusion , background clutter, illumination, scale variation, View-point variation.

Illumination: the variation of the pixels may cause illumination effects . For example if there are two images of same car but one of the image is brighter than the other it might be difficult for the computer to specify them in same cluster .

Intra class variation : variation of images inside the same cluster / class. For example, there is a car cluster which has several cars like sports car ,luxury car , SUV car . So there are several variations in the same cluster/ class cars.

Occlusion : In the image the image we want is occluded for our view . For example , there is a image of a bike which is partially covered in a cloth  and only some part of the bike is visible. The cloth occluded our view of the bike .

Background clutter: In the image there is so much and it is hard for the observer to find particular object. For example , take an image which has many cars and bikes it is difficult for humans to find the particular car or bike he want to observe it will be harder for the computer to find out a particular object . In some cases the background and the object we want are almost similar and is hard to find the difference . For example , if we take a picture of a white car covered in snow with the snow background it is hard to tell the difference.

Scale variation : The images of same object having different sizes . For example , the images of a same bike but in different sizes .

View- point variation : the Images of same object having different orientation with the way the images are captured . For example , the images of a same car but in different orientation view like side view , top view , bottom view , front view and back view .

As we are not experienced we might face some challenges while developing the code and running the simulation.

In this project, we will use Keras and Python to build a convolution neural network on a CIFAR-10 dataset. We will first explore our dataset before training our neural network with Python and Keras.

CIFAR-10 is a well-known computer vision dataset. This dataset has been extensively researched in many types of deep learning research for object recognition.

This dataset contains 60,000 images divided into ten target classes, each with six thousand images of the shape 32\*32. This dataset contains images with a low resolution (32\*32), allowing researchers to experiment with new algorithms. This dataset's ten distinct classes are as follows:

Airplane, Car, Bird, Cat, Deer, Frog, Horse, Ship, and Truck

The CIFAR-10 dataset is already available in Keras datasets module. We do not need to download it; instead, we can import it directly from keras.datasets.

Bipin Medasani - Electronics and Communication engineer, pursuing Master's in CS. I'm well versed in python and C, the tools necessary for implementation of this project. As a senior when I was in undergrad I worked on an application which would help us in converting hand sign language to text pertaining to the language protocols. This is done using Computer vision and various machine learning algorithms. My involvement in this study is to fortify what base knowledge I have and to further amplify our study by branching out.

Sri Sai Phaneesh P - Computer science Engineer , pursuing my Master’s in Computer Science. I am well versed in C, Python, HTML, and basic necessary tools required for this project, and having basic fundamentals on Java, JavaScript, Hadoop, Spark and OOPS concepts. During my undergrad I worked on AI projects which included image classification and machine learning algorithms but ,I am still not well versed in computer vision and trying my best to gain more knowledge. My involvement on this research is I will run the simulation and work on the calculation of the efficiency of the data .

Venkata Sai Kumar G – Electronics and Communication engineer, specialized in Artificial Intelligence & IOT. Currently pursuing Master’s in CS. I’m well versed in Python and C the tools necessary for implementation of this project. And have strong fundamentals of C++, OOP concepts, JAVA, HTML, MATLAB . In my undergrad I have worked on applying machine Learning on Antenna Designs Using MATLAB ADE software in which we developed machine learning models which Optimized the signal’s efficiency and calculated the SNR to the new designs we retrieve from the machine learning models we deployed. While working on Various Projects my knowledge got refined in each segment of AI . My involvement in this thesis is I would like to create sequential model for classification and clustering By training the model by taking inputs from the datasets.

There was a use of CNN, RNN, ROI segmentation, ASL Translator algorithms in few of the papers. There was usage of pool layer model, sequential model and prediction model.

In the pool layer model, the output is given as an in put for each frame before the prediction.

In the prediction model the prediction of CNN was taken as the input for the RNN.

In the sequential model there will be exactly on input tensor and one output tensor.

The pool layer model has better efficiency than the prediction model. Whereas sequential model has better efficiency over the pool model.

Sequential model takes much less time than the pool layer model and prediction model.

In sequential model we can use RNN algorithm. And in RNN algorithm features are not shared in standard neural networks. There are many RNN architectures like many to one, one to many and many to many. But Traditional RNNs are bad at capturing long range dependencies. As there is vanishing gradient problem in RNNs LSTM is preferred over the traditional architectures.

Bipin Medasani: I have worked for 36 hrs researching on CNN, RNN and the prediction model and trying to obtain datasets and my role is to find datasets and help on the development of the code as I have a prior knowledge on this study.

Sri Sai Phaneesh P: I have worked for 35 hrs researching on CNN, RNN and the pool layer model. My role is to run the simulation, calculate the efficiency of the data and help on the development of the code.

Venkata Sai Kumar G: I have worked for 38 hrs researching on CNN, RNN and the sequential model. My main role is to develop the code for the sequential model by taking the datasets as the inputs.

This is our Github repo link